

CLAIMS

What is claimed is:

1. A method of delivering insulin to the bloodstream of a mammalian subject, the method comprising:

administering a formulation to a pancreatic cell of a mammalian subject, the formulation comprising a nucleic acid encoding an islet transcription factor, said administering being in an amount sufficient for production of the islet transcription factor at a level sufficient to induce production of islet cells, wherein the islet cells produce insulin, which insulin is delivered to the bloodstream of the subject.

2. The method of claim 1, wherein the islet transcription factor is neurogenin3.

3. The method of claim 1, wherein the islet transcription factor is a positive regulator of a neurogenin3 (Ngn3) regulatory pathway.

4. The method of claim 3, wherein the islet transcription factor is selected from the group consisting of HNF1, HNF3, and HNF6.

5. The method of claim 1, wherein the islet transcription factor is a neuroendocrine bHLH transcription factor selected from the group consisting of a neurogenin1, neurogenin2, NeuroD1/BETA2, neuroD2, math2, NeuroD4/Math3, math1/ATOH1, mash1/ASCL1/ASH1, and mash2.

6. The method of claim 1, wherein the subject is a human.

7. The method of claim 1, wherein the islet cells produced are beta cells.

8. A method of delivering insulin to the bloodstream of a mammalian subject, the method comprising:

administering a formulation to a pancreatic cell of a mammalian subject, the formulation comprising a nucleic acid encoding neurogenin3, said administering being in an amount sufficient for production of neurogenin3 in the pancreatic cell at a level sufficient to induce an islet cell phenotype in the pancreatic cell, wherein the pancreatic cell produces insulin, which insulin is delivered to the bloodstream of the subject.

9. The method of claim 8, wherein the islet transcription factor is a positive regulator of a neurogenin3 (Ngn3) regulatory pathway.

10. The method of claim 8, wherein the islet transcription factor is a neuroendocrine bHLH transcription factor selected from the group consisting of a neurogenin1, neurogenin2, NeuroD1/BETA2, neuroD2, math2, NeuroD4/Math3, math1/ATOH1, mash1/ASCL1/ASH1, and mash2.

11. The method of claim 8, wherein the subject is a human.

12. A method for producing islet cells in a mammalian subject, the method comprising: introducing a nucleic acid molecule into a pancreatic cell of a mammalian subject, the nucleic acid molecule encoding an islet transcription factor, said introducing being in an amount sufficient for production of the islet transcription factor and production of islet cells in the pancreas of the subject.

13. The method of claim 12, wherein the islet transcription factor is neurogenin3.

14. The method of claim 12, wherein the islet transcription factor is a positive regulator of a neurogenin3 (Ngn3) regulatory pathway.

15. The method of claim 14, wherein the islet transcription factor is selected from the group consisting of HNF1, HNF3, and HNF6.

16. The method of claim 12, wherein the islet transcription factor is a neuroendocrine bHLH transcription factor selected from the group consisting of a neurogenin1, neurogenin2, NeuroD1/BETA2, neuroD2, math2, NeuroD4/Math3, math1/ATOH1, mash1/ASCL1/ASH1, and mash2.

17. The method of claim 12 wherein said subject is a human.

18. The method of claim 12, wherein the islet cells produced are beta cells.

19. A method for producing a mammalian islet cell, the method comprising the steps of: introducing into a mammalian cell a nucleic acid molecule encoding an islet transcription factor, said introducing providing for expression of the islet transcription factor in the mammalian cell and production of the islet cell phenotype in the mammalian cell.

20. The method of claim 19, wherein the mammalian cell is a pancreatic cell.

21. The method of claim 19, wherein the islet transcription factor is neurogenin3.

22. The method of claim 19, wherein the islet transcription factor is a positive regulator of a neurogenin3 (Ngn3) regulatory pathway.

23. The method of claim 19, wherein the islet transcription factor is a neuroendocrine bHLH transcription factor selected from the group consisting of a neurogenin1, neurogenin2, NeuroD1/BETA2, neuroD2, math2, NeuroD4/Math3, math1/ATOH1, mash1/ASCL1/ASH1, and mash2.

24. The method of claim 19, wherein the subject is a human.

25. A method for producing a mammalian islet cell, the method comprising the steps of:

introducing into a mammalian pancreatic cell a nucleic acid molecule encoding neurogenin3 (Ngn3), said introducing providing for expression of Ngn3 in the cell and production of the islet cell phenotype in the cell.

26. The method of claim 25, wherein the islet cell phenotype is that of a pancreatic beta cell.

27. A method for delivering insulin to the bloodstream of a mammalian subject, the method comprising:

introducing an islet cell produced by the method of claim 25 into a pancreas of a mammalian subject, said introducing providing for production of insulin by the islet cell and delivery of insulin to the bloodstream of the mammalian subject.